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PATENT APPLICATION

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

BEFORE THE HONORABLE BOARD OF PATENT APPEALS AND INTERFERENCES

In re the Application of:

Steven R. Moore et al.

Application No.: 09/918,760

Filed: August 1, 2001 Docket No.: 118011

For: BACKLASH REDUCTION

# BRIEF ON APPEAL

Appeal from Group 2854

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## I. INTRODUCTION

This is an Appeal from the Office Action mailed June 25, 2003 finally rejecting claims 1-24 of the present application.

### A. Real Party In Interest

The real party in interest for this Appeal in the present application is Xerox Corporation, which received title by way of an Assignment recorded in the U.S. Patent and Trademark Office.

### B. Statement of Related Appeals and Interferences

There are presently no appeals or interferences, known to Appellant, Appellant's representative or the assignee, which will directly affect or be directly affected by or have a bearing on the Board's decision in the pending Appeal.

### C. Status of Claims

Claims 1-24 are pending and are on appeal. Claims 1-24 stand rejected as discussed further below. A copy of the claims on appeal is set forth in the attached Appendix.

Claim 1 is an independent claim from which claims 2-8 depend either directly or indirectly; claim 9 is an independent claim from which claims 10-15 depend either directly or indirectly; claim 16 is an independent claim from which claims 17-23 depend either directly or indirectly; and claim 24 is an independent claim.

### D. Status of Amendments

A paper entitled "Amendment and Response to Office Action mailed on June 25, 2003" was filed on September 25, 2003. However, no amendments to the claims were included therein.

## II. SUMMARY OF THE INVENTION

With reference to Figures 1-4, in a typical thermal ink jet printer (TIJ), the printer 1 prints on a substrate 2 and includes a substrate transport system 10 including a drive motor 11

and a driven roll 12. Interposed between the drive motor 11 and the driven roll 12 is a gear train 13 or the like that transfers drive from the motor 11 to the roll 12. See Figures 1 and 2. As a result of gaps between teeth in the gear train 13, among other things, backlash arises, which can cause errors in substrate placement. The drive motor 11 may be, for example, a stepper motor driven by a controller 20 that includes a stepper motor drive circuit 21. See paragraph [10] of the specification.

In the present invention, to take up backlash in the transport system 10, the substrate 2 is advanced to a point 31 short of an intended final destination 32. For example, the substrate 2 may be advanced 2N motor steps short 31 of a next printing position 32. The distance between the stopping point 31 and the intended final destination 32 (i.e., the next printing position) can be greater than a total possible backlash error in the drive train 13 between the drive motor 11 and the driven roll 12. Thus, the value for N, for example, would be greater than the total possible steps the motor 11 would have to make to take up the backlash error in the drive train 13. See paragraph [11] of the specification.

At the stopping point 31, the driven roll 12 can be in some indeterminate position within the range of backlash error. The motor 11 then slowly advances the substrate 2 to the intended final destination 32, taking up the backlash in the process. In the example above, the stepper motor 11 makes N additional steps forward to the next printing position 32 and will be parked in the correct position for the next carriage pass. The substrate 2 and the driven roll 12 will end up at the desired final position 32 without any backlash error contribution. See paragraph [12] of the specification.

The apparatus may further include a substrate position sensor 24 to which the substrate advancer can respond, though such position sensors are not necessarily needed. The controller 20 also includes a substrate final advancer 23 in communication with the stepper motor 11. One or more substrate position sensors 24 may be connected to the controller 20,

but such position sensors 24 are not necessarily required. The substrate final advancer 23 sends control signals to the stepper motor 11 that cause the substrate 2 to continue to the intended destination 32. The signals from the substrate advancer 22 cause the stepper motor to stop the substrate a predetermined number of steps, such as N steps, from the intended destination 32, the predetermined number of steps being greater than a total possible backlash error in the drive train. The substrate final advancer 23 signals then cause the stepper motor 11 to advance by the predetermined number of steps, taking up remaining backlash and moving the substrate 2 to the intended final destination 32 of the substrate 2 (the printing position). See paragraph [15] of the specification.

III. THE APPLIED REFERENCES

U.S. Patent No. 5,149,217 to Narita (Narita);

U.S. Patent No. 6,312,177 to Nureki (Nureki); and

U.S. Patent No. 4,519,700 to Barker et al. (Barker).

IV. ISSUES

The issues on appeal are:

(1) whether the subject matter of claims 1-12 and 14-24 is anticipated under 35 U.S.C. §102(b) by Narita;

(2) whether the subject matter of claims 1, 3-12, 14, 16 and 18-24 is anticipated under 35 U.S.C. §102(e) by Nureki; and

(3) whether the subject matter of claims 2, 13, 15 and 17 is unpatentable under 35 U.S.C. §103(a) in view of Narita, Nureki and/or Barker.

V. GROUPING OF CLAIMS

Claims 1-8 are grouped together and thus stand or fall together. Claims 9-15 and 24 are grouped together and thus stand or fall together. Claims 16-23 are grouped together and

thus stand or fall together. Each of these groups of claims are separately patentable as set forth in the separate arguments below.

## VI. ARGUMENTS

### A. Claims 1-12 and 14-24 Are Not Anticipated Under Narita

#### 1. "Final Intended Position"

The Examiner argued in the Office Action dated June 25, 2003 (paper no. 4) that the "final intended position" and similar elements must be defined in the claims and cites *In Re Van Geuns,* 988 F.2d 1181, 26 U.S.P.Q.2d 1057 (CAFC 10 March 1993) in support of this statement. The claim recitation at issue in *In Re Van Geuns* is "uniform magnetic field" wherein it was held that limitations are not to be read into the claims from the specification. Thus, Van Geuns cannot read an NMR limitation into claim 42 to justify his argument as to the meaning of the "uniform magnetic field".

In Van Geuns, "uniform magnetic field" had an ordinary meaning that Van Geuns tried to narrow with additional limitations from the specification regarding NMR and MRI. This case is distinguished from *In Re Van Geuns* in that in the present application, "final intended position" does not have a clear ordinary definition apart from what is provided in the specification. Thus, *In Re Van Geuns* does not apply and the terms in Appellant's claims must be read as defined by Appellant as its own lexicographer.

In particular, the specification, at paragraph [12], defines the intended final position or destination 32 as the desired park position for the next print (i.e., the next pass of the print carriage). More specifically, it is clear from the specification that the intended final location or destination refers to the position where the next print line will be applied to the substrate by the printer. Paragraph [11] of the specification specifically refers to both the "intended final destination" and the "next printing position" as the same thing, identifying both with reference numeral "32". Paragraph [12] reiterates that the intended final destination is "the

next printing position 32." Paragraph [15] also describes moving the substrate to "the intended final destination (the printing position)."

So, the intended destination or position is a next incremental print line, and the claims require stopping short of the next print line, then finally advancing to that print line. Thus, the intended final location or destination is clearly defined in the specification as the next incremental print position, and the Examiner's interpretation that it could be any position along the path of travel of the media, including the discharge paper tray, is incorrect.

2. Narita

Claims 1-12 and 14-24 stand rejected under 35 U.S.C. §102(b) as being allegedly being anticipated by Narita.

Each of independent claims 1, 9, 16 and 24 require advancing paper short of a particular point and then finally advancing, as by incrementally moving the paper in much smaller steps, to a final destination. Specifically, each of independent claims 1, 9, 16 and 24 claim a backlash reduction apparatus or method. Narita fails to disclose reducing backlash.

Instead, Narita merely teaches a micro medium feed mechanism capable of performing independent micro medium feeding functions as well as providing a selected medium feeding increment less than 1 mm employing a step motor. See col. 1 of Narita.

a. Claim 1 and Dependent Claims

The Examiner cited col. 7, lines 63-68 of Narita as disclosing means for stopping (the clutch means as defined by the Examiner) that operates in response to a means for sensing a substrate position, and cited col. 1, lines 7-11 as teaching means for finally advancing the substrate. Appellant agrees that Narita describes a device that can stop the substrate, but nowhere does Narita disclose means that stops the substrate short of a particular point, or means that then finally advances, for example, by incrementally moving the paper in much smaller steps, to the final desired points. Although Narita describes a means to stop the

substrate, nowhere does Narita teach a means that can function to stop the substrate short of a desired position as required by the means of claim 1.

Instead, Narita, at col. 1, lines 7-11, merely discloses a medium feed mechanism capable of performing a plurality of different lengths of micro feeding steps in increments of less than 1 mm. Narita is merely directed to a feed mechanism capable of selectively feeding different types of mediums in predetermined incremental amounts in stepped values less than 1 mm and is not directed to backlash reduction.

Moreover, Narita never defines what a "predetermined increment" is, although it is apparent that it is a single print increment. Nowhere does Narita define a "predetermined increment" as including multiple increments between print positions.

Narita thus clearly lacks means for stopping advance of the substrate short of a final intended position, and means for finally advancing the substrate. More specifically, Narita lacks any teaching of the required functions associated with each of the recited means. Narita merely teaches advancing sheets through a print zone in predetermined increments, and nowhere teaches means to stop advance of a substrate short of a final destination, much less means to finally advance the substrate after it was stopped short.

Thus, nowhere does Narita teach or suggest a backlash reduction apparatus that includes means for stopping advance of the substrate short of a final intended position and means for finally advancing the substrate, as recited in claim 1.

b. Claim 16 and Dependent Claims

As discussed above, Narita thus also fails to teach or suggest a backlash reduction method comprising advancing a substrate to a point short of a final intended position and subsequently finally advancing the substrate to the final intended position, thereby taking up backlash in a substrate transport system, as recited in claim 16.

c. Claims 9 and 24 and Dependent Claims

Regarding claims 9 and 24, Narita also lacks a substrate advancer that emits signals to stop the substrate short of a final destination and lacks a substrate final advancer that sends a signal to advance the substrate to an intended final destination. Thus, Narita fails to teach or suggest a backlash reduction apparatus that includes a controller comprising a substrate advancer in communication with the drive motor, the substrate advancer emitting control signals to the drive motor that cause the substrate to move to a point short of an intended destination, and a substrate final advancer in communication with the drive motor, the substrate final advancer sending control signals to the drive motor that cause the substrate to continue to the intended destination, as recited by claims 9 and 24.

Here again, Narita completely lacks any teachings of an apparatus having the recited elements that operate and interact in the manner recited in claims 9 and 24. The advancement system of Narita completely lacks the elements of claims 9 and 24 for stopping the substrate short of a position and then advancing the substrate to that position.

d. Conclusion

As Narita fails to teach or suggest all of the limitations of each of the independent claims, Appellant respectfully submits that no prima facie case has been established for anticipation or obviousness.

B. Claims 1, 3-12, 14, 16 and 18-24 Are Not Anticipated Under Nureki

Claims 1, 3-12, 14, 16 and 18-24 stand rejected under 35 U.S.C. §102(e) as allegedly being anticipated by Nureki.

Nureki is directed toward a line printer in which disturbances during the start of printing are prevented with low power consumption. See the Abstract.

1. Claim 1 and Dependent Claims

The Examiner cited claim 1 of Nureki when alleging that Nureki discloses means for advancing a substrate and means for finally advancing a substrate. However, here Nureki is merely disclosing a motor control means to stop printing operation after driving the motor in a reverse direction and means for performing a start printing operation to start printing by driving the motor in a forward direction. Here, Nureki is not disclosing means for advancing a substrate and means for finally advancing a substrate.

Nureki does allow for stopping the substrate in that a stop printing operation is performed by driving a stepping motor in a direction reverse to that in which print paper is fed by a predetermined number of steps and then turning off the stepping motor to stop printing. A start printing operation is then preferred in which the stepping motor is driven in a forward direction by the same predetermined number of steps before starting a printing operation. See the Abstract of Nureki.

Nowhere does Nureki disclose means that stops the substrate short of a particular point, or means that then finally advances, for example, by incrementally moving the paper in much smaller steps, to a final intended point (print position). That is, although Nureki describes a means to stop the substrate, nowhere does Nureki teach a means that can function to stop the substrate short of a desired position as required by the means of claim 1.

The Examiner further cited col. 1, lines 10-12 when alleging that Nureki discloses finally advancing the substrate. At col. 1, lines 10-12 of Nureki, it is stated "First, the CPU 101 judges whether the stepping motor 107 is turned off or not in step S301."

The CPU 101 of Nureki merely judges whether the stepping motor is on or off, and then rotates the stepping motor if the stepping motor is turned off. Nowhere does Nureki disclose the CPU 101 finally advancing a substrate. Thus, Nureki also lacks any means for finally advancing the substrate as required in claim 1.

Contrary to the assertion made by the Examiner, nowhere does Nureki teach or suggest an apparatus that includes means for stopping advance of the substrate short of a final intended position and means for finally advancing the substrate, as recited in claim 1.

2. Claim 16 and Dependent Claims

As discussed above, nowhere does Nureki teach or suggest a method of reducing backlash that includes advancing a substrate to a point short of a final intended position and finally advancing the substrate to the final intended position, thereby taking up backlash in a substrate transport system, as recited in claim 16. No such method or method steps are taught or suggested anywhere in Nureki.

3. Claims 9 and 24 and Dependent Claims

Nureki does not teach or suggest a substrate advancer emitting control signals to a drive motor that cause the substrate to move to a point short of an intended destination, and a substrate final advancer in communication with the drive motor, the substrate final advancer sending control signals to the drive motor that cause the substrate to continue to the intended destination, as recited by claims 9 and 24. At least these required claim elements of the device of claims 9 and 24 are completely lacking in Nureki.

4. Conclusion

As Nureki fails to teach or suggest all of the limitations of each of the independent claims, Appellant respectfully submits that no prima facie case has been established for anticipation or obviousness.

C. Claims 2, 13 15 and 17 Are Not Unpatentable Over Narita, Nureki and/or Barker

Claim 13 was rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Narita. Claims 2, 15 and 17 were rejected under 35 U.S.C. §103(a) as allegedly being unpatentable over Nureki in view of Barker.

The Examiner alleged that it would have been obvious to one having ordinary skill in the art at the time the invention was made that the predetermined number of increments is greater than a number of increments representing a total possible backlash error in the drive train since this is what allegedly would be expected during the normal and intended use of the system of Narita or the system of Nureki. (See paper no. 4.)

The Examiner further alleged that it would have been obvious to one having ordinary skill in the art at the time the invention was made to modify the invention of Nureki to incorporate the teaching of a means for sensing a substrate position because Barker allegedly teaches that such an arrangement is beneficial to control the feeding of the printing medium based on the signal from the optical sensor. (See paper no. 4.)

Claim 2 depends from claim 1, claims 13 and 15 depend from claim 9, and claim 17 depends from claim 16. Even if one of ordinary skill in the art would have found:

Narita or Nureki to teach that the predetermined number of increments is greater than a number of increments representing a total possible backlash error in the drive train, as recited in claim 13;

Barker to teach that a means for stopping operates in response to a means for sensing substrate position, as recited in claim 2;

Barker to that teach that the substrate final advancer stops the drive motor when a position sensor detects that the substrate has arrived at the intended destination, as recited in claim 15; or

Barker to teach monitoring substrate position and sending substrate position information to a controller that initiates the advancing and final advancing of the substrate, as recited in claim 17,

the presently claimed invention still would not have been achieved. Specifically, nothing in Narita, Nureki and Barker, alone or in combination, remedies the deficiencies of Narita and Nureki discussed above with respect to claims 1, 9, 16 and 24.

D. Conclusion

For the foregoing reasons, Appellant respectfully submits that Narita, Nureki and/or Barker fail to anticipate, or render obvious, the subject matter of claims 1, 9,16 and 24 or any of the claims dependent therefrom.

VII. CONCLUSION

For all of the reasons discussed above, it is respectfully submitted that it would not have been known or obvious to a person of ordinary skill in the art, at the time the invention was made, to make the subject invention from the teachings of the references relied upon by the Examiner. Appellant respectfully requests that this Honorable Board reverse the rejections of claims 1-24.

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Enclosure:
Appendix

Date: December 24, 2003

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DEPOSIT ACCOUNT USE AUTHORIZATION
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APPENDIX

CLAIMS:

1. A backlash reduction apparatus comprising:

means for advancing a substrate;

means for stopping advance of the substrate short of a final intended position; and

means for finally advancing the substrate.

2. The apparatus of claim 1 wherein the means for stopping operates in response to a means for sensing substrate position.

3. The apparatus of claim 1 wherein the means for finally advancing comprises means for incrementally advancing the substrate.

4. The apparatus of claim 3 wherein the means for incrementally advancing comprises a position-controlled servo motor.

5. The apparatus of claim 3 wherein the means for incrementally advancing comprises a stepper motor.

6. The method of claim 5 wherein the means for finally advancing operates the stepper motor in full steps.

7. The method of claim 5 wherein the means for finally advancing operates the stepper motor in fractions of steps.

8. The method of claim 5 wherein the means for finally advancing operates the stepper motor in microsteps.

9. A backlash reduction apparatus comprising:

a drive motor that can rotate in increments;

a drive train driven by the drive motor;

at least one substrate transport mechanism connected to the drive train and driven by the drive motor therethrough;

a controller comprising:

a substrate advancer in communication with the drive motor, the substrate advancer emitting control signals to the drive motor that cause the substrate to move to a point short of an intended destination; and

a substrate final advancer in communication with the drive motor, the substrate final advancer sending control signals to the drive motor that cause the substrate to continue to the intended destination.

10. The apparatus of claim 9 wherein the drive motor is a position-controlled servo motor.

11. The apparatus of claim 9 wherein the drive motor is a stepper motor.

12. The apparatus of claim 9 wherein the signals from substrate advancer cause the drive motor to stop the substrate a predetermined number of increments from the intended destination.

13. The apparatus of claim 12 wherein the predetermined number of increments is greater than a number of increments representing a total possible backlash error in the drive train.

14. The apparatus of claim 12 wherein the substrate final advancer signals cause the drive motor to advance by the predetermined number of increments.

15. The apparatus of claim 9 wherein the substrate final advancer stops the drive motor when a position sensor detects that the substrate has arrived at the intended destination.

16. A backlash reduction method comprising:

advancing a substrate to a point short of a final intended position;

finally advancing the substrate to the final intended position, thereby taking up backlash in a substrate transport system.

17. The method of claim 16 further comprising monitoring substrate position and sending substrate position information to a controller that initiates the advancing and final advancing of the substrate.

18. The method of claim 16 wherein finally advancing includes advancing the substrate at a lower speed than the speed at which the substrate was advanced to the point short of the final intended destination.

19. The method of claim 16 wherein finally advancing includes advancing the substrate incrementally from the point short of the final intended destination to the final intended destination.

20. The method of claim 16 further comprising providing a drive motor, providing a substrate transport driven by the drive motor, and advancing and finally advancing the substrate is achieved by operation of the drive motor and substrate transport.

21. The method of claim 20 wherein providing a drive motor comprises providing a stepper motor and finally advancing the substrate includes operating the stepper motor in full steps.

22. The method of claim 21 wherein finally advancing the substrate includes operating the stepper motor in fractions of steps.

23. The method of claim 21 wherein finally advancing the substrate includes operating the stepper motor in microsteps.

24. A backlash reduction apparatus comprising:

a drive motor operable in increments;

a drive train driven by the drive motor;

at least one substrate transport mechanism connected to the drive train and driven by the drive motor therethrough;

a controller comprising:

a substrate advancer in communication with the drive motor, the substrate advancer emitting control signals to the drive motor that cause the substrate to move to a point short of an intended destination; and

a substrate final advancer in communication with the drive motor, the substrate final advancer sending control signals to the drive motor that cause the substrate to continue to the intended destination; and

the backlash reduction apparatus executing a method comprising:

advancing a substrate to a point short of a final intended position; and

finally advancing the substrate to the final intended position, thereby taking up backlash in a substrate transport system.